



TRENCHING SAFETY

A Near Death Experience

Recently, one of our members had a near catastrophe when a trench they were digging collapsed on two workers. Both were completely engulfed. A very short countdown began at that instant. The trench was about 12 feet deep and the district was making a connection between two laterals inside the city limits. The trench had vertical walls in a clay/clay composition soil. There was a light drizzle in the morning, but the rest of the day was dry but humid and the soil was very moist.

Just as a combination of factors comes into play to create the circumstances of a fatal accident, some very fortunate factors contributed to the survival of the buried workers. One man was able to extend his arm upward as the soil cascaded down so that his gloved fingertips were just visible at the surface. Other workers at the site began to dig frantically to get them out, but those visible fingertips were the signpost that led to the first extraction. A second life-saving factor was that the collapse happened in the city limits. First responders were able to get there quickly and take charge of the rescue. Had the cave-in happened outside the city limits in open country the situation probably would have turned out tragically.

Another positive factor was the composition of the soil. It contained large clods and created voids when it fell on the workers. They were able to extract the man whose visible gloved hand showed where he was fairly quickly, but the other man was trapped for almost an hour. Fortunately, the man trapped for almost an hour was still able to breathe until frantic efforts opened an area where his head could be seen. The clumpy nature of the dirt created air pockets that allowed him to breathe and survive.

Physical injuries were relatively minor; cuts and bruises and a broken clavicle. Both workers were treated and released. Then what?

When the crew re-assembled at the shop, they were very distraught. Soon after the accident the rains came and shut down field work for a few days. The General Manager took this opportunity to send the crew members to the Texas Extension Service's (TEEX) Excavation and Trenching Training. The Fund's Loss Control Consultant was also there the next week after the workers completed their training to help the group plan their next excavation project by leading them through what they learned in their training. He also recommended providing counseling to anyone who felt the need.

Knowledge and Resources to Prevent a Tragedy

What should a district know about trenching safety? The Fund recommends training for any employee that will engage in trenching. TEEX is one of the best resources for this training. Their Excavation and Trenching Training courses last three full days. That is the

first step. Consult the TEEEX website at <http://www.TEEEX.org> and go to the Heavy Equipment section where you will see three courses related to trenching safety.

The most important element of a District’s approach to trenching safety and effectiveness is the “competent person.” OSHA and TEEEX define the competent person as someone who is trained in soil type recognition and what trench safety measures should be taken when all relevant conditions are considered. OSHA standards require that trenches be inspected daily and as conditions change by a competent person prior to worker entry to ensure elimination of excavation hazards. OSHA describes the competent person “as an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees and who is authorized to take prompt corrective measures to eliminate or control these hazards and conditions.” (OSHA website, *Trenching and Excavation Safety*, www.osha.gov/publicatons). “Prompt corrective measures” include the ability to shut the job down immediately. Although public entities in Texas are not subject to OSHA regulation, OSHA is still one of the best sources for policies and procedures regarding workplace safety.

The competent person is thoroughly involved in the planning stages of the excavation project and is involved daily as the project progresses. Important considerations include where the excavated soil is placed, routes for the movement of heavy equipment, placement of ladders in the trench, and use of shoring when necessary. The competent person is on site at all times. From the Fund’s perspective this person is the key to safer trenching. Be aware however, that whenever you are digging below the surface an excavator may encounter soil conditions and other buried hazards or obstacles that can change safety considerations in an instant.

According to OSHA a cubic yard of dirt can weigh up to 3,000 pounds. How is a collapse prevented once the excavation begins? In situations where space is very crowded by structures or roads, a steel shoring box may be required as the only effective way to prevent a collapse. When there is plenty of room on site the trench can be stair stepped back (benching) in increments. The safest way is to slope the walls of the excavation away at an angle depending on the soil type as shown in the table below. All three of these measures are determined by the competent person and engineering staff or consultants who have prepared the design for a new pipeline or lateral system.

Soil Type	OSHA Requirements	Recommended Sloping	Angle in degrees
	Slope		
A	3/4 foot Horizontal/1 foot vertical		53°
B	1 foot Horizontal/1 foot vertical		45°
C	1 1/2 feet Horizontal/1 foot vertical		34°

Source: *Utility Contractor 9/12/2013, “Back to Basics: Sloping and Benching”*

When shoring is required, or the trench is deeper than 15 feet an engineer should be consulted. As noted in the table, soil type is extremely important in determining the safety of any excavation.

Soil types are defined in:

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=10931&p_table=STANDARDS.

Soil typing is complex with many factors beyond a simple description of the soil. Presence of water, dipping layers toward the excavation, and compressive strength of the soil as determined with a penetrometer are some of the other factors that training will reveal.

Other issues to consider include:

- Air quality in the trench (much like a confined space)
- Ladders every 25 feet for any trench deeper than five feet
- Rain or snow
- Water coming into the trench
- Nearby traffic
- Movement of heavy equipment near the trench
- Existing utilities intersecting or near the trench
- Where to put the excavated material safely
- These precautions apply to open excavations as well

In addition to these considerations, members should also require contractors performing trenching operations during district projects to follow the same safety guidelines. Most construction related contracts (and RFP processes) require a qualified safety person on the job site as well as an effective safety program. This includes safe trenching, a “competent person” and use of shoring, benching or sloping when warranted. If your construction related contracts need safety provisions the Fund’s risk management consultant can help.

The Fund’s Risk Control Consultants can also help you choose courses to train your employees engaged in excavation. Training should also include heavy equipment operators, engineers and supervisors who oversee excavations. The Fund does not train for excavation and trenching because of the complexity and specialization required. However, the Fund’s Risk Control Consultants can review any ongoing or planned excavation work for compliance with excavation safety best practices.